

verified the species of mosses. This project was partially funded by a British Columbia Graduate Research Engineering and Technology Award in conjunction with E.V.S. Consultants to the senior author.

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### NEW AND LITTLE KNOWN SCALE INSECTS (HOMOPTERA: COCCOIDEA) FROM BRITISH COLUMBIA

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### ABSTRACT

Thirty-six species of scale insects (Coccoidea) belonging to 6 families were recovered during a recent collecting trip in British Columbia. Of these, 16 species (*Orthezia newcomeri*, *Anisococcus oregonensis*, *Heterococcus nudus*, *Phenacoccus capensis*, *Phenacoccus colemani*, *Phenacoccus solani*, *Spilococcus geraniae*, *Spilococcus keiferi*, *Tridiscus* sp., *Trionymus caricis*, *Trionymus utahensis*, *Acanthococcus greeni*, *Physokermes concolor*, *Physokermes hemicryphus*, *Physokermes taxifoliae*, *Stramenaspis kelloggi*) are new records for Canada and 26 new for British Columbia. The latter now has 42 species. The level of infestation, phenological stage, host plant data (including several new associations) and the localities of collections are also presented.

### Résumé

Lors d'un récent voyage de cueillette effectué en Colombie-Britannique, on a rapporté trente-six espèces de cochenilles (Coccoidea) appartenant à 6 familles. Seize de ces espèces (*Orthezia newcomeri*, *Anisococcus oregonensis*, *Heterococcus nudus*, *Phenacoccus capensis*, *Phenacoccus colemani*, *Phenacoccus solani*, *Spilococcus geraniae*, *Spilococcus keiferi*, *Tridiscus* sp., *Trionymus caricis*, *Trionymus utahensis*, *Acanthococcus greeni*, *Physokermes concolor*, *Physokermes hemicryphus*, *Physokermes taxifoliae*, *Stramenaspis kelloggi*) sont de nouveaux records pour le Canada, et 26 d'entre elles sont nouvelles en Colombie-Britannique, qui compte maintenant 42 espèces. Le rapport traite du degré d'infestation et du stade phénologique; il fournit également des données sur les plantes hôtes (y compris plusieurs nouvelles associations) et sur les localités où a eu lieu la cueillette.

### INTRODUCTION

The scale insect fauna of Canada is poorly known. Scudder (1979) noted that 56 species have been recorded from Canada. No comprehensive work exists for the Coccoidea of Canada, however, Footitt and Williams (pers. comm.) have prepared a list of the scale insect species in the slide holdings of the Canadian National Collection.

Venables (1939) published a preliminary checklist of scale insects of British Columbia, listing 14 species, primarily from the Okanagan Valley and Vancouver areas. Limited additional records (host associations, localities) for the province can be found in the taxonomic works of Ferris (1937-1955) and Richards (1958) and in the applied entomological literature (Downing *et al.* 1956; Glendenning 1925; Evans 1982, 1983; Furniss and Carolin 1977; Hopping 1937; Kondo and Moody 1986; Madsen and Morgan 1975; Rubin and Beirne 1975; Waddell 1952). Our paper presents the results of brief collecting trips in the vicinity of Penticton (late June), and Vancouver and Victoria (early July), British Columbia during 1988. It is hoped that the records presented here will stimulate additional studies of the Coccoidea in British Columbia and Canada.

Microscope slides of the species collected are deposited in the collection of the Plant Protection Institute, Hungarian Academy of Sciences (Budapest, Hungary), with duplicates deposited in the collection of the Pacific Forestry Centre (PFC), Forestry Canada (Victoria, B.C.). As well, for those host plants indicated by an '\*', dry plant material with scale insects is deposited in the PFC reference collection.

## RESULTS

A total of 36 species of scale insects belonging to 6 families, was collected in British Columbia in late June and early July, 1988. The species collected are listed by family. Data for each species are given in the following order: scientific name, geographic location and date of collection, (day, month, year), place (niche) of collection, sex and developmental stage(s) of scales, level of infestation, and identification number (in parentheses) of slides in the collection of the senior author. Forest Insect and Disease Survey (FIDS) registration numbers are provided for specimens originating from the PFC reference collection. Additional information such as taxonomic characters and geographic distribution is presented for some species. Those species which represent new records for the Canadian fauna are marked with an X and those new for British Columbia are marked with an O before the scientific name. Names of native species of host plants conform to those of Scoggan (1978a,b, 1979). The level of infestation is marked as F (frequency) (on a scale of 0 to 4) (Kozár and Viktorin 1979). All collection data without special reference are those of the senior author, assisted in some cases by L.M. Humble.

### I. Ortheziidae

1. O *Arctorthezia occidentalis* Douglas, 1891. Furry Creek, 5 km S of Britannia, 07.07,1988, among mosses, females, nymphs, F=1 (3307); Victoria (Highland Rd.), 12.07,1988, between mosses\*, female, first instar nymphs, eggs, F=2 (3330). While this species normally has 8-segmented antennae, all females from our collections have 7-segmented antennae. Morrison (1952) also reported one specimen with 7-segmented antennae. This variation needs further study, as it may indicate that *A. occidentalis*, as currently understood, includes some undescribed species. This species is widely distributed from California to Alaska, including the Vancouver area (Morrison 1925, 1952).

2. O X *Orthezia newcomeri* Morrison, 1952. Summerland, 30.06,1988, *Artemisia frigida* Willd. (Compositae), on the leaves, female, first instar nymphs, F=1 (3278). This species was previously recorded on *Penstemon* (Scrophulariaceae) from Yakima County, WA, USA (Morrison 1952).

### II. Pseudococcidae

3. O X *Anisococcus oregonensis* Ferris, 1950. Summerland, 30.06,1988, *Antennaria parvifolia* Nutt. (Compositae), on leaves, females, F=1 (3289). Our specimens differ from the

original description (Ferris 1950) in that the antennae are 9-segmented instead of 8, the ostioles are hardly noticeable, and there are some differences evident in the structure of the frontal cerarii. It will be necessary to collect additional material to determine the significance of this variation. Until now this species was known only from California and Washington (USA) on *Eriogonum umbellatum* Torr. (Polygonaceae) (McKenzie 1967).

4. O X *Heterococcus nudus* (Green, 1926). Summerland, 30.06,1988, *Haplopappus* sp. (Compositae), on roots, female, F=1 (3281); Langford (Savory Rd.), 12.07,1988, *Agropyron* sp. (Gramineae), in leaf sheaths, females (yellowish), first instar nymphs, eggs, F=2 (3344). This species is widely distributed in Palearctic and Nearctic regions. In the United States it is known also from Yakima, WA (Miller 1975).

5. *Phenacoccus aceris* (Signoret, 1875). Victoria (urban), 10.07,1988, *Ulmus* sp. (Ulmaceae), dead females, eggs, F=1 (3313); Victoria (urban), 10.07,1988, *Acer* sp. (Aceraceae), dead females, eggs, F=2 (3314); Victoria (urban), 10.07,1988, *Prunus* sp. (Rosaceae), dead females, F=2 (3321). This species is a widely distributed pest in the Holarctic Region (Kosztarab and Kozár 1988), and is well known in Canada (Ferris 1950).

6. O X *Phenacoccus capensis* Ferris, 1950. Hwy. 99, 17 km N of Brackendale, 07.07,1988, *Spiraea douglasii* Hook. (Rosaceae), on roots, females, F=1 (3302). Our specimens differ from the original description by having fewer thin tubular ducts ventrally and more thick tubular ducts dorsally. Based on these characters, our specimens resemble *P. colemani*; however, the latter lacks the cerarian-like structure on its dorsum. Until now this species was known only from Mexico on *Phyllanthus* (Euphorbiaceae) (Ferris 1950).

7. O X *Phenacoccus colemani* Ehrhorn, 1906. Furry Creek, 5 km S of Britannia, 07.07,1988, *Holodiscus discolor* (Pursh) Maxim. (Rosaceae), on twig, female, F=1 (3311). This species was previously known only from the southern part of the Nearctic Region on *Arctium* and *Encelia* (Compositae), *Arctostaphylos* (Ericaceae), *Eriogonum* (Polygonaceae), *Garrya* (Garryaceae), *Lantana* (Verbenaceae), *Mahonia* (Berberidaceae), *Castilleja* and *Pedicularis* (Scrophulariaceae), *Phacelia* (Hydrophyllaceae), *Rubus* (Rosaceae), and *Symphoricarpos* (Caprifoliaceae) (Ferris 1950; McKenzie 1967).

8. O X *Phenacoccus solani* Ferris, 1918. Summerland, 30.06,1988, *Haplopappus* sp., on roots, female, F=1 (3281); Summerland, 30.06,1988, *Centaurea diffusa* Lam. (Compositae), on roots, female, F=1 (3288). This species is widely distributed in the Nearctic Region (McKenzie 1967) and in other parts of the world (Williams, Blair and Khasimuddin 1985).

9. O *Pseudococcus affinis* (Maskell, 1894) [=obscurus Essig, 1909]. Victoria (indoor), 13.07,1988, *Amaryllis* sp. (Amaryllidaceae), females, nymphs and eggs, F=3 (3350). A cosmopolitan pest species, found on a wide variety of unrelated hosts. In the northern parts of the temperate zone it is found only in greenhouses (Cox 1987; Furniss and Carolin 1977; McKenzie 1967).

10. O X *Spilococcus geraniae* (Rau, 1938). Hwy. 99, 17 km N of Brackendale, 07.07,1988, *Gaultheria shallon* Pursh. (Ericaceae), on roots, females (greenish), nymphs and eggs, F=2 (3303). This species was previously known only from New York and California on *Geranium robertianum* L. (Geraniaceae) and *Artemisia douglasiana* Bess. (Compositae), respectively (McKenzie 1967).

11. O X *Spilococcus keiferi* McKenzie, 1960. Summerland, 30.06,1988, *Haplopappus* sp., on roots, females, F=2 (3281); Summerland, 30.06,1988, *Antennaria parvifolia*, on roots, females, F=1 (3289). This species is known from California and Washington on *Ambrosia* and *Franseria* (Compositae) and various Gramineae (McKenzie 1967).

12. O X *Tridiscus* sp. Victoria (sea coast), 10.07,1988, *Agropyron* sp.\*, in leaf sheaths, female, eggs, F=2 (3320). This is a new species and will be described elsewhere (Kozár and Footitt, pers. comm.).

13. O X *Trionymus caricis* McConnel, 1941. Langford (Savory Rd), 12.07,1988, *Elymus* cf. *innovatus* Beal (Gramineae) and *Vulpia microstachys* (Nutt.) Munro\* (Gramineae), in leaf sheaths, females (lilac), eggs, F=1 (3345). This species is almost identical to the Palearctic *T. radicum* (Newstead, 1895). *T. caricis* was previously known only from the USA (California, Maryland and Tennessee) on *Carex* (Cyperaceae) and *Elymus* and *Uniola* spp. (Gramineae) (McKenzie, 1967).

14. O X *Trionymus utahensis* (Cockerell, 1916). Summerland, 30.06,1988, *Elymus piperi* Bowden (Gramineae), in leaf sheaths, females, eggs, first instar nymphs, F=1 (3292); Langford (Savory Rd.), 12.07,1988, *Agropyron* sp., in leaf sheaths, females (lilac), eggs, first instar nymphs, F=1 (3344). Previously, this species was known only from the USA on various grasses (McKenzie 1967).

### III. Eriococcidae

15. O X *Acanthococcus greeni* (Newstead, 1898). Summerland, 30.06,1988, *Agropyron intermedium* (Host) Beauv.\* (Gramineae), on leaves, females, eggs, F=3 (3283); Summerland, 30.06,1988, *Festuca ovina* L.\* (Gramineae), on leaves, females, F=1 (3286). The specimens agree with the descriptions of *A. greeni* given by Williams (1985). It is a common grass-inhabiting species occurring throughout the Palearctic including the Far East and Siberia in the U.S.S.R. (Danzig, 1980). Some morphological similarities to *A. bahiae* (Ehrhorn) were also evident; however, the latter species has been found only on the roots of *Bahia* sp. (Compositae) from California (Ferris 1950). Because of the incomplete knowledge of the Eriococcidae in North America, the taxonomic status of the species is questionable.

16. O *Gossyparia spuria* (Modeer, 1778). Summerland, 30.06,1988, *Ulmus* sp.\*, females F=3 (3282); Vancouver (UBC), 07.07,1988, *Alnus crispa* ssp. *sinuata* (Regel) Hult.\* (Betulaceae), females, first instar nymphs, F=2 (3298). A common pest of *Ulmus* in the Holarctic Region, including Canada (Kosztarab and Kozár 1988; Furniss and Carolin 1977).

### IV. Coccidae

17. O *Chloropulvinaria (Pulvinaria) floccifera* (Westwood, 1870). Vancouver (UBC), 07.07,1988, *Prunus laurocerasus* L.\* (Rosaceae), on leaves, females, eggs, first instar nymphs, F=3 (3299). A cosmopolitan pest, previously known from Canada (Furniss and Carolin 1977; Hamon and Williams 1984).

18. O *Coccus hesperidum* (Linnaeus, 1758). Victoria (indoor), 13.07,1988, *Citrus* sp.\* (Rutaceae), females and nymphs, F=3 (3349). A common cosmopolitan pest, also well known in Canada. In northern regions found in greenhouses only (Hamon and Williams 1984).

19. *Eulecanium tiliae* (Linnaeus, 1758). Vancouver (Stanley Park), 01.07,1988, *Rosa* sp.\* (Rosaceae) and *Acer* sp., dead females and male test, F=3 (3294, 3295); Vancouver (Stanley Park), 01.07,1988, *Vaccinium* sp. (Ericaceae), dead females, F=1 (3296); Vancouver (UBC), 07.07,1988, *Alnus crispa* ssp. *sinuata*\*, dead females, male tests, second instar nymphs, F=3 (3298); Furry Creek, 5 km S of Britannia, 07.07,1988, *Holodiscus discolor*, dead females, male tests, F=1 (3311); Furry Creek, 5 km S of Britannia, 07.07,1988, *Alnus rubra* Bong.\* (Betulaceae), female, male, first instar nymphs, F=1 (3312); Victoria (urban), 10.07,1988, *Ulmus* sp., dead females, male tests; F=3 (3313); Victoria (urban), 10.07,1988, *Malus pumila* Mill. (Rosaceae), dead females, male tests, F=1 (3319); Victoria (urban), 10.07,1988, *Prunus domestica* L. (Rosaceae), dead females, male tests, F=1 (3319); Victoria (urban), 10.07,1988, *Prunus domestica*, dead females, male tests, F=3 (3321); Victoria (PFC), 11.07,1988, *Crataegus monogyna* Jacq.\* (Rosaceae), female, male, F=1 (3325); Duncan (Chesterfield Rd.), 12.07,1988, *Sorbus* sp.\* (Rosaceae), dead females, F=1 (3340); Duncan (Koksilah), 12.07,1988, *Betula papyrifera* Marsh.\* (Betulaceae) and *Acer campestre* L.\* (Aceraceae), dead females, first instar nymphs, F=1 (3341, 3343); Langford (Savory Rd.), 12.07,1988, *Salix* sp.\* (Salicaceae), dead females, male tests, first instar nymphs, F=1 (3346). A common cosmopolitan pest, well known in Canada (Kosztarab and Kozár 1988).

20. *O Neopulvinaria (Pulvinaria) innumerabilis* (Rathvon, 1854). Summerland, 30.06,1988, *Spiraea* sp., dead females, F=1 (3275). Widely distributed in the USA and Canada (Gill 1988; Furniss and Carolin 1977).

21. *Parthenolecanium corni* (Bouché, 1844). Summerland, 30.07,1988, *Cornus* sp. (Cornaceae), dead females, F=1 (3273); Summerland, 30.06,1988, *Spiraea* sp., dead females, first instar nymphs, F=1 (3275); Summerland, 30.06,1988, *Rosa acicularis* Lindl. (Rosaceae), dead females, F=1 (3275); Victoria (Highland Rd.), 12.07,1988, *Acer* sp., dead female, male tests, F=1 (3329). A common pest in the northern hemisphere, including Canada (Furniss and Carolin 1977; Kosztarab and Kozár 1988).

22. *O Parthenolecanium pruinosum* (Coquillett, 1891). Victoria, 13.07,1964, *Veronica* sp. (Scrophulariaceae), from the collection of the Pacific Forestry Centre, FIDS 64.1570.01, (3350). A common pest in North America, including Canada (Gill 1988).

23. *O Parthenolecanium quercifex* (Fitch, 1859). Duncan (Koksilah), 12.07,1988, *Quercus coccinea* Muenchh. (Fagaceae), females, F=2 (3343). This species is morphologically identical with the European species, *P. rufulum* (Cockerell, 1903), but the question of synonymy will require study of the types.

24. *O X Physokermes concolor* Coleman, 1903. Tofino, 12.06,1987, *Picea sitchensis* (Bong.) Carr. (Pinaceae), females, eggs, first instar nymphs, from the PFC reference collection, FIDS 87.349.01, (3350a). This species was identified on the basis of post reproductive females only. There were also several first instar nymphs on the needles and in the female bodies which showed extreme morphological variability. Additional study of young females and first and second instar nymphs of both sexes is needed to determine the range of natural variation of these characters. The species was previously known only from California on *Abies concolor* Hoopes (Pinaceae) (Gill 1988).

25. *O X Physokermes hemicyphus* (Dalman, 1826). Vancouver (Stanley Park), 01.07,1988, *Picea abies* Karst. (Pinaceae), dead females, eggs, first instar nymphs, F=1 (3293); Vancouver (UBC), 07.07,1988, *Picea glauca* (Moench) Voss\*, dead females, first instar nymphs, F=2 (3301); Victoria (PFC), 11.07,1988, *Picea engelmannii* Engelm.\*, females, eggs, first instar nymphs, F=1 (3324); Duncan (Chesterfield Rd.), 12.07,1988, *Picea abies*\*, dead females, first instar nymphs, F=3 (3338); Summerland, 07.06,1982, *Picea glauca*\*, females, from the PFC reference collection, FIDS 82.0115.01, (3351). The latter material needs further study, especially of the first and second instar nymphs, which are the most useful stages for the identification of species of *Physokermes*. Until recently most collections of *Physokermes* in the USA and Canada were identified as *Physokermes piceae* (Schrank) (Gill 1988; Kondo and Moody 1986). Most identifiable lots of *Physokermes* on spruce in the United States have now been shown to be the similar Palearctic species, *P. hemicyphus*, not *P. piceae* (Gill 1988). The same may also be true for Canada, but will require additional collection and study.

26. *O X Physokermes taxifoliae* Coleman, 1903. Duncan (Chesterfield Rd.), 12.07,1988, *Pseudotsuga menziesii* (Mirb.) Franco (Pinaceae), females, eggs, first instar nymphs, F=1 (3334). Well known in California and Oregon (Gill 1988). The first instar nymphs of *P. taxifoliae* are very similar to those of *P. fasciatus* Borchsenius from U.S.S.R. (Central Asia) and *P. inopinatus* Danzig and Kozár from Hungary. However, there are some differences in the female morphology which require further study.

#### V. Asterolecaniidae

27. *Asterodiaspis variolosa* (Ratzeburg, 1870), Victoria (urban), 10.07,1988, *Quercus* sp.\* (Fagaceae), females, eggs, nymphs, F=3 (3315); Langford (Savory Rd.), 12.07,1988, *Quercus garryana* Dougl.\*, dead females, eggs, first and second instar nymphs, F=1 (3348). Widely distributed in the USA and Canada (Ferris 1955).

## VI. Diaspididae

28. *Carulaspis juniperi* (Bouché, 1851). Summerland, 30.06, 1988, *Thuja plicata* Donn\* (Pinaceae), females, eggs, F=2 (3280); Victoria (PFC), 11.07, 1988, *Juniperus communis* L.\* (Pinaceae), females, eggs, first instar nymphs, F=3 (3328); Duncan (Chesterfield Rd.), 12.07, 1988. *Chamaecyparis nootkatensis* (D. Don) Spach\* (Pinaceae), females, eggs, first instar nymphs, F=4 (3336). A cosmopolitan pest, widely distributed in North America (Borchsenius 1966; Furniss and Carolin 1977). In early North American literature this species was sometimes referred to as *Carulaspis visci* (Schrank) (Ferris 1937).
29. *Chionaspis pinifoliae* (Fitch, 1856). Summerland, 30.06, 1988, *Pinus ponderosa* Laws.\* (Pinaceae), second instar nymphs, F=3 (3279); Vancouver (UBC), 07.07, 1988, *Pinus* prob. *contorta* Dougl. ex Loudon\*, dead females, eggs, first instar nymphs, F=3 (3300); Victoria (urban), 10.07, 1988, *Pinus* sp., dead females, F=1 (3316); Victoria (PFC), 11.07, 1988, *Pinus* sp. and *Pseudotsuga menziesii*, females, F=1 (3322, 3323); Victoria (PFC), 11.07, 1988, *Picea engelmannii*, females, F=1 (3324); Victoria (PFC), 11.07, 1988, *Pinus ponderosa*, females, eggs, F=2 (3326); Duncan (Chesterfield Rd.), 12.07, 1988, *Pseudotsuga menziesii*, females, F=1 (3334); Duncan (Chesterfield Rd.), 12.07, 1988, *Pinus mugho* Turra\*, females, eggs, F=2 (3335); Duncan (Chesterfield Rd.), 12.07, 1988, *Pinus* sp., dead females, F=1 (3337). A widely distributed pest in North America (Borchsenius 1966; Furniss and Carolin 1977).
30. *Lepidosaphes ulmi* (Linnaeus, 1758). Summerland, 30.06, 1988, *Cornus* sp., dead females, F=1 (3273); Summerland, 30.06, 1988, *Populus balsamifera* L.\* (Salicaceae), dead females, first instar nymphs, F=3 (3274); Summerland, 30.06, 1988, *Rosa acicularis*\*, dead females, first instar nymphs, F=3 (3276); Summerland, 30.06, 1988, *Malus pumila*, dead females, first instar nymphs, F=3 (3277); Summerland, 30.06, 1988, *Ribes cereum* Dougl. (Saxifragaceae), dead females, first instar nymphs, F=4 (3284); Furry Creek, 5 km S of Britannia, 07.07, 1988, *Salix sitchensis* Sanson\* (Salicaceae), dead females, first instar nymphs, F=2 (3310); Furry Creek, 5 km S of Britannia, 07.07, 1988, *Alnus rubra*\*, dead females, F=1 (3312); Victoria (urban), 10.07, 1988, *Crataegus oxyacantha* L.\* (Rosaceae) and *Malus pumila*, dead females, first instar nymphs, F=3 (3317, 3318); Langford (Savory Rd.), 12.07, 1988, *Holodiscus discolor*\*, dead females, first instar nymphs, F=3 (3347). Widely distributed pest all over the world (Kosztarab and Kozár 1988; Furniss and Carolin 1977).
31. *Nuculaspis californica* (Coleman, 1903). Summerland, 30.06, 1988, *Pinus ponderosa*\*, females, F=3 (3279); Duncan (Chesterfield Rd.), 12.07, 1988, *Picea abies*, dead females, F=1 (3338); Summerland, 07.06, 1982, *Picea glauca* from the PFC reference collection, FIDS 82.115.01, (3351). Widely distributed pest in North America (Borchsenius 1966; Furniss and Carolin 1977).
32. O *Quadraspidotus gigas* (Thiem and Gerneck, 1934). Langford (Savory Rd.), 12.07, 1988, *Salix* sp.\*, dead females, F=1 (3346). Widely distributed pest in the northern hemisphere (Kosztarab and Kozár 1988), but its distribution in North America is not well known.
33. *Quadraspidotus ostreaeformis* (Curtis, 1843). Duncan (Chesterfield Rd.), 12.07, 1988, *Aesculus hippocastanum* L. (Hippocastanaceae), dead females, F=1 (3339). Widely distributed pest all over the world (Kosztarab and Kozár 1988).
34. *Quadraspidotus perniciosus* (Comstock, 1881). Summerland, 30.06, 1988, *Malus pumila*, females, first instar nymphs, F=4 (3277). Widely distributed pest all over the world (Kosztarab and Kozár 1988).
35. O *Rhizaspidotus dearnessi* (Cockerell, 1898). Summerland, 30.06, 1988, *Erigeron filifolius* Nutt.\* (Compositae) and *Artemisia frigida*\*, females, F=1 (3290, 3291). This species is known only from Canada, USA and Mexico (Borchsenius 1966).
36. O X *Stramenaspis kelloggi* (Coleman, 1903). Victoria (PFC), *Pinus* sp., 11.07, 1988, females, F=1 (3323). This species was previously known only from the USA (Borchsenius 1966; Furniss and Carolin 1977).

## DISCUSSION

Our collection of scale insects in British Columbia yielded 36 species belonging to 6 families, namely Ortheziidae (2), Pseudococcidae (12), Eriococcidae (2), Coccidae (11), Asterolecaniidae (1) and Diaspididae (8). Of the species collected, 16 proved to be new for the scale insect fauna of Canada and 26 are new for British Columbia.

From a zoogeographical point of view the scale-insect fauna of British Columbia is very heterogeneous. Boreal or montane species such as *Arctorthezia occidentalis*, *Heterococcus nudus*, and *Acanthococcus greeni* as well as thermophilous species such as *Anisococcus oregonensis*, *Phenacoccus capensis*, *Spilococcus geraniae* or the subtropical *Chloropulvinaria floccifera* are represented in the diverse habitats examined. Our limited collections show that the British Columbia fauna seems to be rich in scale insects, and therefore, deserves more intensive studies.

## ACKNOWLEDGEMENT

The senior author wishes to express his gratitude to Dr. Nello P.D. Angerilli (Agriculture Canada Research Station, Summerland, B.C.) for his help and hospitality. We would like to thank: Dr. E.T. Oswald (Forestry Canada, PFC, Victoria, B.C.) for determining some of the plants; Drs. L. Safranyik, T. Sahota and H. Moeck (Forestry Canada, PFC) for reviewing an earlier draft of the manuscript; J. Drozdjak (Plant Protection Institute, Budapest) for the microscopic slide mounting; and OTKA for the financial support (Grant No. 1334) to the senior author.

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## NEW RECORDS OF SLENDER WINTER STONEFLIES (PLECOPTERA: CAPNIIDAE) IN BRITISH COLUMBIA

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### ABSTRACT

Distribution data for 15 species of Capniidae are presented, supplementing the annotated checklist of Ricker and Scudder (1975). Five species (*Bolshecapnia milami*, *Capnia coloradensis*, *C. petila*, *C. sextuberculata* and *Utacapnia trava*) are reported from British Columbia for the first time.

### INTRODUCTION

Since the publication of Ricker and Scudder's (1975) annotated checklist of the Plecoptera of British Columbia, knowledge of the local distribution of the slender winter stoneflies (Capniidae) has increased considerably. Ricker (1943) documented the occurrence of many valley inhabiting species in southwestern British Columbia, but made few visits to higher altitudes during the winter and early spring. In recent years many collections have been made in these habitats, especially in the southern part of the province. However, the central and northern sections of the province remain largely *terra incognita*, although recent collecting in the Yukon allows some interpolation of range information. The following data are largely the result of collections made by myself and colleagues; these specimens are in the Spencer Entomological Museum, University of British Columbia. However, collections in Rocky Mountain parks made by D.B. Donald and R.S. Anderson of the Canadian Wildlife Service are also included; the lentic stoneflies of these collections were reported in a summary fashion in Donald and Anderson (1980). These specimens are in the collections of the Canadian Wildlife Service, Edmonton, Alberta.